McCabe Thiele Method

A saturated liquid mixture containing 60 mole % benzene and 40 mole % toluene is to be distilled continuously into a distillate product containing 90 mole % benzene and the bottom product containing 5 mole % benzene. The fractional distillation column will operate at approximately constant pressure of 1 atm. The reflux ratio is 2. How many theoretical plates must the column have if the feed is introduced into the eighth plate? Equilibrium data are:

x	**0**	**0.017**	**0.075**	**0.13**	**0.211**	**0.288**	**0.37**	**0.411**	**0.581**	**0.78**	**1**
y	**0**	**0.039**	**0.161**	**0.261**	**0.393**	**0.496**	**0.591**	**0.632**	**0.777**	**0.9**	**1**

Data:

$z_F = 0.6$

$x_D = 0.9$

$x_W = 0.05$

$R = 2$

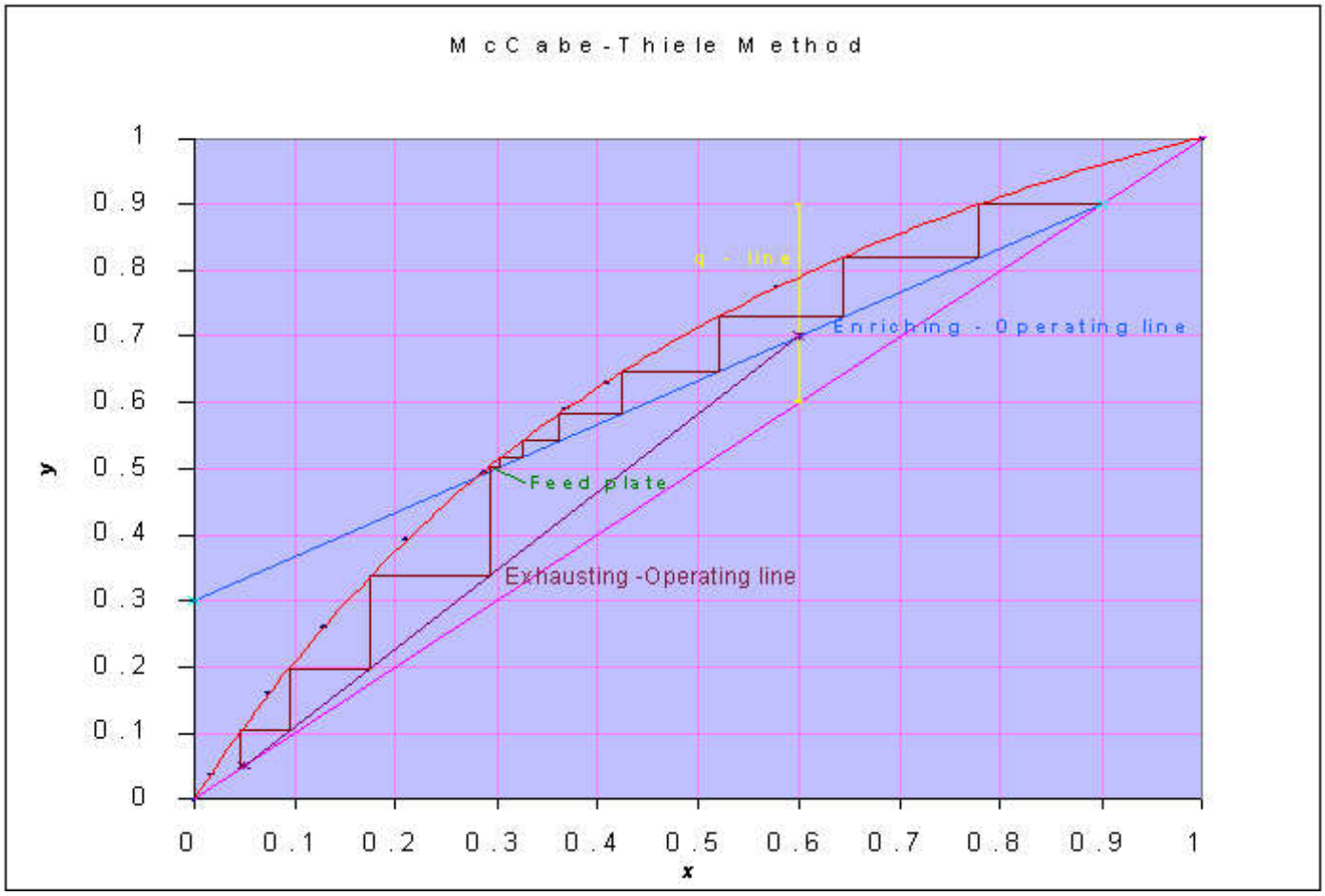
$x_D/(R + 1) = 0.9/(2 + 1) = 0.3$

Feed is saturated liquid

Calculations:

For saturated liquid feed, slope of 'q-line' is ∞ .

The equilibrium data are plotted and by McCabe-Thiele method, number of theoretical plates is found to be = 11 for feed introduced at 8^{th} plate.



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